

## ABSTRACT

A wastewater treatment system includes a vertical flow marsh cell that is adapted to contain media and to support plants having roots extending into the media, the roots and media positioned to contact water flowing downward through the marsh cell during a flooding stage, the media and plant roots providing surfaces to which biofilms can adsorb, the biofilms containing bacteria adapted to adsorb ammonium ions and nitrify ammonium ions to nitrate during an aerated drained phase. The marsh cell is configured to receive water from an outlet of a horizontal wetland that functions essentially anaerobically/anoxically to contain bacteria for transforming nitrate into nitrogen gas. Water to be treated and water exiting the marsh cell outlet are transportable to a wetland inlet, providing dilution of incoming wastewater. Treated water is discharged from the wetland outlet.